PATENT SPECIFICATION

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Index at acceptance:—Classes 32, B2x; and 64(iii), VI.

COMPLETE SPECIFICATION

An Improved Method of and Means for Condensing Corrosive Vapours

We, SOCIÉTÉ POUR L'EXPLOITATION DES PROCÉDÉS AB-DER-HALDEN, a French body corporate, of 26, rue de la Baume, Paris, France, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a method of condensing the vapours of substances which are liable to attack the metal of which pipe-coils are composed; the invention also relates to a pipe-coil cooler for putting the method into practice.

In known pipe-coil coolers, for example, those mounted to follow distillation columns, vapours flow into the coil at its upper end and the condensed liquid flows out at its lower end. In order that the flow may be possible, it is necessary that the temperature of the cooling coil should be sufficiently high to obviate solidification of the liquid, which would be liable to obstruct the pipe-coil of the cooler. During their passage through the coil the vapours and the liquid attack the metal of the coil at the temperature in question, and this may have serious disadvantages.

Thus, it is known that phenol derivatives are acid products which attack steel when in hot state. Though the wear caused thereby is small, such attack results in colouring the condensed products and renders them unacceptable. This difficulty is generally overcome by employing coolers made of copper, rustless steel, and even silver-plated material, whereby the cost of the apparatus is considerably increased.

The object of this invention is to remedy this difficulty by means of a pipe-coil made of any desired metal, and by choosing for cooling said pipe-coil such a cooling liquid that the concerned corrosive substances are solid at the temperature of the cooling liquid.

The method according to the invention consists in introducing the vapours at the lower end of a reflux-operating pipe-coil, evacuating the condensed product likewise at the lower end thereof, and using a cooling fluid having a temperature such that the temperature of the coil walls is lower than the solidification point of the condensate, so as to line the said coil walls with a film of solid product and thus protect the coil metal from being attacked by the vapours or the liquid.

The device according to the invention is of the type comprising a pipe-coil immersed in a cooling tank, wherein said pipe-coil has branched thereto, at the immersed lower end thereof, a vapour inlet conduit, the lower end of said pipe-coil being connected with the condensate collector and the upper end thereof being adapted to discharge the uncondensed vapours.

The accompanying drawing shows by way of example a cooling device with a helical coil for carrying into effect the method according to the invention.

Hot vapours coming in through a conduit 1 are introduced into the lower end of a helical reflux-operating pipe coil 2. The condensate is discharged through a conduit 3. Water or other cooling agent, introduced at the tank bottom through an inlet 4, circulates in parallel with the vapours and flows out through an outlet 5. A vacuum may be created if desired through a connection 6 for non-condensed vapours.

It will be seen that hot vapours arriving in through the conduit 1 come immediately into contact with a cooled wall, the temperature of the latter being so regulated that the vapours condense and solidify in the form of a solid film, which protects the metal of the pipe-coil from being attacked by the product in question. For example, in the case of the condensation of phenol vapours there is formed on the cold coil wall a film of phenic acid or of crystallised ortho-cresol.

The thickness of this film is self-regulating, for if it becomes too thick the abstraction of heat by the cooling fluid

will be no longer effected, and the vapours will cause it to melt until the heat transmission is restored. This obviates any necessity for regulating the cooling fluid supply, while the outflow of the condensate through the conduit 3 is maintained automatically by keeping the condensate above its melting point.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A method of condensing the vapours of substances which attack the metal of the condensing pipe-coil, consisting in introducing the vapours into a reflux-operating pipe-coil at the lower end thereof, discharging the condensate likewise at the lower end of the coil, and utilising a cooling fluid having a temperature such that the temperature of the coil walls is lower than the solidification point of the condensate, so as to line the said walls with a film of solid product, thereby protecting the coil metal from being attacked by the vapours or the liquid.

2. A cooling device for condensing vapours by the method claimed in claim 1, of the type comprising a pipe-coil immersed in a cooling tank, wherein said pipe-coil has, branched thereto, at the immersed lower end thereof, a vapour inlet conduit, the lower end of said pipe-coil being connected with the condensate collector and the upper end thereof being adapted to discharge the uncondensed vapours.

3. A method of or means for condensing the vapours of substances which attack the metal of condensing pipe-coils, substantially as hereinbefore described with reference to the accompanying drawing.

Dated this 23rd day of October, 1945.
MARKS & CLERK.

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